

1 PERSONAL PHYSICAL FITNESS DIAGNOSTIC EVALUATION SYSTEM &  
2 METHOD  
3 CROSS-REFERENCE TO RELATED APPLICATIONS

4       This non-provisional utility patent application claims the benefit of a prior  
5 filed provisional application: 60/455,098 filed 03/14/2003, which is incorporated  
6 herein by reference in its entirety.

7 Background of the Invention

8 (1) Field of the Invention

9       The present invention relates generally to physical fitness and, more particularly, to a  
10 system and method for facilitating personal physical fitness diagnostic evaluations.

11 (2) Description of the Prior Art

12       The present invention is directed to a personal fitness diagnostic system and  
13 method for facilitating diagnostic evaluation for an individual. In a preferred  
14 embodiment, a handheld electronic device having input and output means is provided  
15 with formulas for calculating predetermined diagnostic physical fitness indicators, where  
16 a user inputs data and an output is generated therefrom for indicating the physical fitness  
17 of an individual based on predetermined parameters.

18       The personal training industry is beginning a new era. The general public is receiving  
19 more and more media hype about getting into shape to better enhance their lifestyles.  
20 How does an individual really know if they are “getting into shape”, “toning up”, or  
21 “putting on muscle”? Is feeling better really measurable? Stepping on the scales can be  
22 deceiving and frustrating too. Providing measurable results from an established baseline  
23 truly demonstrates effectiveness from any training program regardless of the client’s  
24 goals. Providing clients a printable baseline demonstrates the beginning point and

1 illustrates the cutting edge of technology with personal training. The key to client  
2 retention is to achieve results and to provide immediate feedback on the client's baseline  
3 fitness evaluation and ongoing improvements.

4 Prior art fitness evaluations commonly employs manual data gathering and  
5 calculation, which can be time-consuming and introduce opportunities for mistakes in  
6 data documentation or errors in calculation. While calculators or computers have been  
7 used in the past to aid in providing results from fitness evaluation and testing, these are  
8 generally limited in application because they are not usable at the site of the fitness  
9 testing and do not provide the mobility that a personal trainer requires in providing  
10 services to clients, particularly in a typical gym or fitness setting.

11 Thus, there remains a need for a lightweight, mobile, hand-held device for use in  
12 personal training having automatic calculation of fitness factors for use in an evaluation  
13 of an individual's physical fitness, both at a given instant and as it changes over time with  
14 respect to a benchmark or baseline, such as an initial screening or testing at the start of an  
15 exercise or fitness program, in particular where a personal trainer is administering the  
16 testing and involved in providing guidance, training, and oversight in the individual's  
17 fitness program.

#### 18 Summary of the Invention

19 The present invention is directed to a hand-held device for use in personal training  
20 and fitness evaluation for automatically calculating predetermined, select factors relevant  
21 to an individual's fitness based upon user inputs.

22 In the preferred embodiment, the present invention provides for automatic  
23 calculation of select, predetermined factors relevant for an individual's fitness evaluation

1 and testing and produces results in a printable format for providing a hard copy to the  
2 individual or for a file.

3 Preferably, a hand-held computer-type device is used to store the formulas in an  
4 executable format when data is input by the user for the automatic calculation of select,  
5 predetermined factors relevant for an individual's fitness evaluation and testing.

6 The present invention is further directed to a method for automatic calculation of  
7 select, predetermined factors relevant for an individual's fitness evaluation and testing.

8 Accordingly, one aspect of the present invention is to provide a hand-held  
9 computer-type device is used to store the formulas in an executable format when data is  
10 input by the user for the automatic calculation of select, predetermined factors relevant  
11 for an individual's fitness evaluation and testing.

12 Another aspect of the present invention is to provide a method for automatic  
13 calculation of select, predetermined factors relevant for an individual's fitness evaluation  
14 and testing including the steps of providing a hand-held device having a software  
15 program with formulas relevant for an individual's fitness evaluation and testing; a user  
16 inputting data relevant to the individual to be evaluated; the device automatically  
17 calculating select, predetermined factors; and the device outputting the factors in a  
18 readable and/or printable format.

19 These and other aspects of the present invention will become apparent to those  
20 skilled in the art after a reading of the following description of the preferred embodiment.

#### 21 Brief Description of the Drawings

22 Figure 1 shows a user interface view of input/outputs according to the system and method  
23 according to the present invention.

1 Figure 2 shows another user interface view of input/outputs according to the system and  
2 method according to the present invention.

3 Figure 3 shows another user interface view of input/outputs according to the system and  
4 method according to the present invention.

5 Detailed Description of the Preferred Embodiments

6 In the following description, it is to be understood that such terms as “forward,”  
7 “rearward,” “front,” “back,” “right,” “left,” “upwardly,” “downwardly,” and the like are  
8 words of convenience and are not to be construed as limiting terms.

9 Referring now to a preferred embodiment for the purpose of describing the  
10 invention, the following descriptions are not intended to limit the invention thereto.

11 The present invention, including a hand-held computer-type device is used to  
12 store the formulas in an executable format when data is input by the user for the  
13 automatic calculation of select, predetermined factors relevant for an individual’s fitness  
14 evaluation and testing, has the capability to perform the health history questionnaire  
15 noting red flags that may limit prescription of program or fitness testing for the client,  
16 personal goals information concerning client as well as commitment goals, and  
17 determining baseline specs of client. The present invention also includes a hand-held  
18 computer-type device is used to store the formulas in an executable format when data is  
19 input by the user for the automatic calculation of select, predetermined factors relevant  
20 for an individual’s fitness evaluation and testing. A software is also provided according  
21 to the present invention that may be run on the device or alternatively on a computer for  
22 providing the automatic calculation of select, predetermined factors and other user input  
23 factors relevant for an individual’s personal fitness evaluation, testing, and tracking over

1 time. Preferably, the software provides for information relating to at least one individual  
2 and preferably a multiplicity of individual's information to be stored in a database format  
3 for storing, retrieving, searching, and updating user information.

4 Figure 1 shows a user interface view of input/outputs according to the system and  
5 method according to the present invention, specifically fitness evaluation test results  
6 outputs based upon inputs provided by a user, the inputs including but not limited to  
7 name, age, weight, sex, height, date, BMI, body fat percentage, upper and lower body  
8 strength, cardiovascular power, sit and reach flexibility test results, personal goals, and  
9 workout commitment based upon user interaction with the testee.

10 Figure 2 shows another user interface view of input/outputs according to the  
11 system and method according to the present invention, namely general information, body  
12 composition, upper and lower body strength max testing, sit and reach flexibility test,  
13 personal trainer, and the like.

14 Figure 3 shows another user interface view of input/outputs according to the  
15 system and method according to the present invention, namely performance enhancement  
16 based upon predetermined variables.

17 The device and software running thereon preferably capable of performing the  
18 following functions individually, collectively, and/or in combination:

19 Differentiating between various information inputted during questionnaire that is  
20 pertinent in calculating proper equations based on specific tests performed but not limited  
21 to baseline data and test evaluation results. Determining proper calculation of specific  
22 equations regarding tests aid to determine and develop client's results. Providing  
23 explanations for test results in both common and scientific language. Functions include

determining results based on data entered and obtained from client's fitness evaluation / test through calculations from equations and data base information. Some information is transposed from data entry. Capability to apply fitness evaluation results to resistance training and cardiovascular training programs as well as fitness evaluation test results. Descriptions of safe / proper testing protocols as well as functioning for effective exercises during resistance and cardio training. Basis for comparison between non-exercise / test results with actual accurate measurements performed during evaluation. Capability to determine resting heart rate, training heart rate, and blood pressure with ease to client. Ability to transport and record data throughout facility while testing of client is in progress. Maintain database of clients' records from evaluation to evaluation. Produce graphing capabilities to illustrate progress with clients from evaluation to evaluation and workout to workout. Produce printable hardcopies for clients' personal files. Compatibility to function with facilities' computer systems makes it fully operational without major upgrades. Multifunctional capability is easily understand and operate by personal trainers at facility. The present invention hardware is compact in size and simple Q & A format aids quick accurate results. Total operational access is simplified without mainframe computer on facility to print results. The addition of the present invention software modifies and enhances the detailed capabilities of the present invention hardware. Bottom line to perform the tasks of initial and on-going fitness evaluation / testing / program development by personal trainers or in-home individuals to easily gain accurate results as well as illustrate progress and provide information to maintain progress.

Table 1.

Fitness Factors

1       □ Body Composition

- 2           ➤ Transposes BIA for comparison w/ Skin fold & BMI  
3           ➤ Calculates BMI  
4           ➤ Determines results of BMI calculation  
5           ➤ Calculates non-test estimate of body fat from BMI  
6           ➤ Choice of 3 or 7 Site Skin fold Analysis  
7           ➤ Specifies which sites to use for 3-Site Skin fold pending men or women  
8           ➤ Calculates body fat results from standard protocol Skin fold measurements  
9           ➤ Provides Body Composition percentile of health status  
10          ➤ Calculates WHR  
11          ➤ Determines results of WHR

12       □ Upper Body Strength

- 13           ➤ Configures whether sub-max or max test was performed  
14           ➤ Projects estimated max when sub-max test is performed  
15           ➤ Provides Upper Body Strength percentile

16       □ Lower Body Strength

- 17           ➤ Configures whether sub-max or max test was performed  
18           ➤ Projects estimated max when sub-max test is performed  
19           ➤ Provides Lower Body Strength percentile

20       □ Cardiovascular (VO<sub>2</sub>MAX) Power

- 21           ➤ Configures whether sub-max or max test was performed  
22           ➤ Determines which test was performed based on information cued  
23           ➤ Calculates VO<sub>2</sub> for either sub-max or max pending on test performed  
24           ➤ Calculates non-exercise estimated VO<sub>2</sub>  
25           ➤ Provides non-exercise estimated VO<sub>2</sub> results for comparison  
26           ➤ Provides Cardiovascular VO<sub>2</sub> Percentile  
27           ➤ Calculates Target Heart Rate Range  
28           ➤ Calculates MET Level Range  
29           ➤ Transposes Resting Heart Rate in beats per minute  
30           ➤ Transposes Blood Pressure when applicable

31       □ Flexibility

- 32           ➤ Determines maximal effort from up to three readings  
33           ➤ Provides Flexibility percentile  
34

35   Additional information that is preferably input to the device, either directly via user  
36   interfaces having prompts and/or other graphics for facilitating input, includes but is not  
37   limited to :

38   General Information, including but not limited to at least one client name, at least one test  
39   date, and corresponding client age, weight, sex, height is transposed;

40   Personal Goals, such as a listing of at least one client's own goals and their workout  
41   commitment regarding number of days per week, number of hours per day and current  
42   activity level; and Personal Trainer's name.

1 Table 2. Formulas

2  $BMI = (weight * .454) / (height * .0254)^2$

3 Estimated % Fat from BMI:

4 Males =  $(1.6 * BMI) - 25.1$  Females =  $(2.2 * BMI) - 21.4$

5 Men 3-Site Skinfold Measurements = chest/2 + abdomin/2 + thigh/2

6 Women 3-Site Skinfold Measurements = tricep/2 + suprailliac/2 + thigh/2

7 7-Site Skinfold Measurements =

8 chest/2 + axilla/2 + tricep/2 + subscapular/2 + abdomin/2 + suprailliac/2 + thigh/2

9 Men 3-Site Body Density =  $1.10938 - .0008267 (sum) + .0000016 (sum)^2 - .0002574 (age)$

10 Women 3-Site Body Density =  $1.099421 - .0009929 (sum) + .0000023 (sum)^2 - .0001392 (age)$

11 Men 7-Site Body Density =  $1.112 - .00043499 (sum) + .00000055 (sum)^2 - .00028826 (age)$

12 Women 7-Site Body Density =  $1.097 - .00046971 (sum) + .00000056 (sum)^2 - .00012828 (age)$

13 Percentage Body Fat by Race and Sex:

14 Indian (F) =  $(4.81 / Db) - 4.34 * 100$

15 Indian (M) =  $(4.95 / Db) - 4.50 * 100$

16 Black (F) =  $(4.85 / Db) - 4.39 * 100$

17 Black (M) =  $(4.37 / Db) - 3.93 * 100$

18 Hispanic (F) =  $(4.87 / Db) - 4.41 * 100$

19 Hispanic (M) =  $(4.95 / Db) - 4.50 * 100$

20 Asian (F) =  $(4.76 / Db) - 4.28 * 100$

21 Asian (M) =  $(4.97 / Db) - 4.52 * 100$

22 White (F) =  $(5.10 / Db) - 4.66 * 100$

23 White (M) =  $(5.07 / Db) - 4.64 * 100$

24 White (F) =  $(5.05 / Db) - 4.62 * 100$

25 White (M) =  $(4.99 / Db) - 4.55 * 100$

26 White (F) =  $(5.01 / Db) - 4.57 * 100$

27 White (M) =  $(4.95 / Db) - 4.50 * 100$

28 Waist-To-Hip Ratio = Waist (in) / Hip (in)

29 Sub-Max Upper Body Strength = # Reps (2 to 15)  $\approx$  100% - (5% to 40%)

30 Estimated Upper Body Strength Max = Weight Pushed / Body Weight

31 Upper Body Strength Max = Weight Pushed / Body Weight

32 Sub-Max Lower Body Strength = # Reps (2 to 15)  $\approx$  100% - (5% to 40%)

33 Estimated Lower Body Strength Max = Weight Pushed / Body Weight

34 Lower Body Strength Max = Weight Pushed / Body Weight

35 Flexibility Max = Maximal number obtained

36 Rockport 1-Mile Walk Test =  $132.853 - .1692 (weight\ kg) - .3877 (age) + 6.315 (men\ only) - 3.2649 (time\ min) - .1565 (end\ HR)$

38 Bruce Treadmill Test =  $14.8 - 1.379 (time\ min) + .451 (time\ min)^2 - .012 (time\ min)^3$

39 Houston Non-Exercise (M) =  $67.350 - BMI (.754) - age (.381) + activity\ code (1.921)$

40 Houston Non-Exercise (F) =  $56.363 - BMI (.754) - age (.381) + activity\ code (1.921)$

41 Queens College Step Test (M) =  $111.33 - (.42 * HR\ end)$

42 Queens College Step Test (F) =  $65.81 - (.1847 * HR\ end)$

43 Storer Cycle Ergometer Test =  $403.4 + 10.22 (Mwatt) + 7.15 (wt\ kg) - 7.91 (age) - 252.2 (females\ only)$

45 Ebbeling 4-Minute Treadmill Walk Test =  $15.1 + 21.8 (speed) - .327 (HR) - .263 (age * speed) + .00504 (HR * speed) + 5.980 (males\ only)$

47 YMCA Cycle Test =  $1.8 * Mwatt\ from\ chart / (wt\ kg) + 7 (220-age) - HR$

48 Target Heart Rate Range =  $220 - age - RHR * (.5 \& .75) + RHR$

49 Target MET Level Range =  $VO_2 / 3.5 * (.5 \& .75) + 3.5$



1 Weight in kg = weight lbs \* .454      Height in in = feet \* 12 + inches  
2 BMI status = range from < 18.5 to > 30  
3 WHR status = Men range from > .94; Women range from > .82  
4 Decision based formulas are based on information inputted from tests performed i.e.  
5 choice 3 or 7-Site Skinfold, Max or Sub-Max Strength Test, VO<sub>2</sub> Test  
6 Percentiles are obtained from applicable charts utilizing appropriate figures and statistics.  
7  
8 Additional formulas are provided in the attached documents (5 pages).  
9

10       The basis of the present invention allows time efficiency for achieving results from a  
11 fitness evaluation and testing for both the client and trainer immediately after the testing  
12 is completed. The present invention defines the absolute fitness evaluation with ease by  
13 providing pertinent information about a client's fitness level by performing necessary  
14 calculated results from measurements and comparison figures as well as providing an  
15 average statistical percentile. The present invention revolutionizes a complete form of  
16 fitness evaluation by illustrates the highest standard in professionalism and technology in  
17 the fitness industry for both the client and personal trainer. Providing results is the  
18 foundation between the client and the personal trainer. The present invention bridges the  
19 initiation process providing a baseline to the client, which acts as a testable measure to  
20 illustrate progressive results throughout the transformation process. The transformation  
21 process provided by a personal trainer should be one that is measurable. The present  
22 invention allows accurate calculations throughout the client/trainer's relationship  
23 ensuring that measurable progressive results are being achieved through the services of a  
24 personal trainer.

1           A design example is shown in the attached figures, illustrating some graphic user  
2 interfaces of the device, including user inputs, and select, predetermined factors relevant  
3 for an individual's fitness evaluation.

4           Attached is a presentation of graphic user interfaces (GUIs) that are included in  
5 the present invention. A prompt or indication of what the user is to enter is provided,  
6 along with an example of an entry by the user, e.g., enter weight, enter height, body type,  
7 etc. An indication of other user entries based upon test results is also included in the  
8 present invention, by way of example and not limitation, percent body fat, blood  
9 pressure, resting heart rate, body measurements such as waist and hip, skin fold testing,  
10 and the like. Additionally, some GUIs provide for the user to make a selection from a  
11 predetermined listing of choices, e.g., male/female, race, etc. Depending upon which  
12 selection is made, a different series of GUIs may follow that correspond to that particular  
13 selection, such as which skin fold location is used. In some cases, a multiplicity of  
14 measurements are required; where a significant difference exists between the  
15 measurements for a single location, e.g., for skin fold, then an additional measurement  
16 may be prompted for and/or either a single reading is retained by the device or an average  
17 is taken and retained by the device. Furthermore, select GUIs indicate tests to be  
18 performed by an individual and then those test results are entered, by way of example and  
19 not limitation, upper body strength test, lower body strength test, cardiovascular tests,  
20 flexibility, etc. Note that each test may have a multiplicity of entries, including number  
21 of repetitions, time or duration of the test or exercise, weights used, and the like. An  
22 entry of personal goals and/or commitment level is also provided for in a GUI.  
23 Additional information like the personal trainer's name, number of evaluation, and the

1 like. The device preferably provides for a storage capacity of at least one user, preferably  
2 a multiplicity of users, more particularly at least 50 users. Estimated body fat percentage  
3 loss and optimal weight range estimations are preferably provided for each user, based  
4 upon the information previously entered as set forth in the foregoing. Graphical output of  
5 information and/or results, and predicted performance gains and weight/body fat  
6 percentage loss is preferably provided by the present invention.

7 A method is also provided according to the present invention for automatic  
8 calculation of select, predetermined factors relevant for an individual's fitness evaluation  
9 and testing including the steps of providing a hand-held device having a software  
10 program with formulas relevant for an individual's fitness evaluation and testing; a user  
11 inputting data relevant to the individual to be evaluated; the device automatically  
12 calculating select, predetermined factors; and the device outputting the factors in a  
13 readable and/or printable format. According to the present invention, the method of  
14 using the hand-held device and formulas set forth hereinabove includes the steps of:  
15 providing a hand-held computer-type device used to store the formulas in an executable  
16 format when data is input by the user for the automatic calculation of select,  
17 predetermined factors relevant for an individual's fitness evaluation and testing;  
18 inputting information into the device;  
19 differentiating between various information inputted during questionnaire that is pertinent  
20 in calculating proper equations based on specific tests performed but not limited to  
21 baseline data and test evaluation results;  
22 determining proper calculation of specific equations regarding tests aid to determine and  
23 develop client's results;

1 providing explanations for test results in both common and scientific language;  
2 determining results based on data entered and obtained from client's fitness evaluation /  
3 test through calculations from equations and data base information;  
4 transposing select information from data entry to be included in the evaluation;  
5 applying fitness evaluation results to resistance training and cardiovascular training  
6 programs as well as fitness evaluation test results;  
7 describing safe and proper testing protocols as well as functioning for effective exercises  
8 during resistance and cardio training;  
9 comparing between non-exercise / test results with actual accurate measurements  
10 performed during evaluation;  
11 determining resting heart rate, training heart rate, and blood pressure with ease to client;  
12 transporting and recording data throughout facility while testing of client is in progress;  
13 maintaining database of clients' records from evaluation to evaluation;  
14 producing graphing capabilities to illustrate progress with clients from evaluation to  
15 evaluation and workout to workout;  
16 producing printable hardcopies for clients' personal files;  
17 functioning in conjunction with and/or communicating with facilities' computer systems  
18 makes it fully operational without major upgrades.

19 Certain modifications and improvements will occur to those skilled in the art upon  
20 a reading of the foregoing description. By way of example, mobile telephones having  
21 expanded capabilities such as the capacity to handle spreadsheets or other software for  
22 formulaic calculations, internet access, and the like may be used in place of a hand-held  
23 computer-type device as described in the foregoing. Also, rather than having direct

1 printing capabilities, the device as described may use a wireless connection to transmit  
2 data to a printer or other computer media for printing. All modifications and  
3 improvements have been deleted herein for the sake of conciseness and readability but  
4 are properly within the scope of the present invention.